



Illustration by Frank L. Beebe; used with permission of Royal British Columbia Museum; <http://www.royalbcmuseum.bc.ca/>

# Golden Eagle

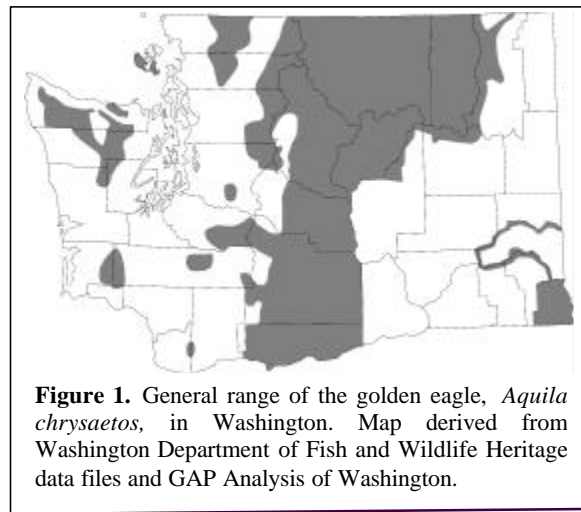
*Aquila chrysaetos*

Last updated: 2003

Written by Jim Watson and Morie Whalen

## GENERAL RANGE AND WASHINGTON DISTRIBUTION

Golden eagles are distributed throughout much of the northern hemisphere (Kochert et al. 2002). In Washington, golden eagles nest throughout much of the state, but are most common in the north-central highlands transitional area between montane and shrub-steppe habitats (see Figure 1). Scattered nest sites are found in more arid portions of eastern Washington and west of the Cascades where the species is uncommon (Larrison and Sonnenberg 1968). The migratory status of nesting golden eagles in Washington has not been studied; observations of golden eagles along the upper Columbia River suggest they remain at nest sites throughout the winter (Knight et al. 1979).



## RATIONALE

The golden eagle is a State Candidate species. This species is vulnerable to population declines due to habitat loss and disturbance, loss of foraging areas, and through direct human-caused mortality (Franson et al. 1995, Kochert et al. 2002).

## HABITAT REQUIREMENTS

Golden eagles are commonly associated with open, arid plateaus deeply cut by streams and canyons, western shrub-steppe and grassland communities and transition zones between shrub, grassland and forested habitat (De Smet 1987, Marzluff et al. 1997). Nests generally are located on cliffs and are occasionally located in trees (Anderson and Bruce 1980, Menkens and Anderson 1987, Kochert et al 2002). Golden eagles use the same territory annually but may use alternate nests in different years. This species uses an average of 2-3 alternate nests (range: 1-14 alternate nests) (Snow 1973). Individual eagles mature and may establish territories and breed during their fifth summer but are capable of breeding earlier in life (Kochert et al. 2002).

Although they are more common east of the Cascades, golden eagles are sometimes found in mature and old-growth forests near the edges of clearcuts in western Washington (Anderson and Bruce 1980). Golden eagle nesting was observed in the San Juan Island archipelago (<10 pairs) during the 1970s and 1980s (Washington State Wildlife Heritage Database). Bruce et al. (1982) found that golden eagle tree nests in western Washington were generally

smaller than bald eagle nests, were placed at or below canopy height, and were located no more than 500 m (1,600 ft) from large clearcuts (<10 years old) or open fields. In another study, bald eagle nests were located at or above the canopy on the interior of a stand and were closer to water than golden eagle nests (Anderson and Bruce 1980).

Shrub-steppe and native grassland communities provide important foraging habitat for the golden eagle (Marzluff et al. 1997, Kochert et al. 2002). Small to medium-sized mammals such as hares (*Lepus* spp.), ground squirrels (*Citellus* spp.), marmots (*Marmota* spp.), mountain beaver (*Aplodontia rufa*) and birds (e.g., pheasant, grouse) are important prey for golden eagles (McGahan 1967, Olendorff 1976, Bruce et al. 1982, Steenhof and Kochert 1988, Marzluff et al. 1997). Based on a survey of prey remains at 74 nests in eastern Washington, yellow-bellied marmots were the most important prey of nesting golden eagles, whereas carrion was regularly consumed in fall and winter (Marr and Knight 1983). Golden eagles nesting on large cliffs in the Columbia Basin commonly capture rock doves (*Columba livia*) that roost on canyon walls (J. Watson, personal observation). Jackrabbits and ground squirrels were historically more abundant in the Northwest (Richardson et al. 2001, Yensen and Sherman 2003) and likely were a more significant source of prey for the golden eagle. Extensive poisoning of ground squirrels in the 1980s, and possibly other factors (S. Zender, personal communication), significantly reduced Townsend's (*Citellus townsendi*) and Washington ground squirrel (*Citellus washingtoni*) populations in Washington (Washington State Wildlife Heritage Database) to the degree that they are being reviewed for status listing. Several researchers (Bates and Moretti 1994, Steenhof et al. 1997, McIntyre 2002) have found increased productivity in golden eagles in years with a higher abundance of hare. McIntyre (2002) and Steenhof et al. (1997) found that golden eagle reproduction was related to prey abundance, with more pairs producing eggs and increased numbers of young fledged when prey numbers were higher. Some eagles conserve energy by suspending their breeding activity when food supplies decrease (Steenhof et al. 1997, McIntyre 2002).

Densities of golden eagles in the western states range from one pair per 34 km<sup>2</sup> to 251 km<sup>2</sup> (13-96 mi<sup>2</sup>) (Phillips et al. 1984). In Wyoming, prime golden eagle habitat as defined by high population densities consisted of a mixture of cliffs and trees suitable for nesting and open habitat with abundant and diverse prey (Phillips et al. 1984). Home range size, size of core areas, and travel distances can vary dramatically based on habitat composition, potential prey abundance and individual preferences (Marzluff et al. 1997).

## LIMITING FACTORS

Golden eagle populations appear to be limited by habitat availability and disturbance, adequate prey populations (e.g., large rodents, rabbits and hares), and the availability of undisturbed nest sites (Olendorff and Stoddard 1974, Beecham and Kochert 1975, Kochert and Steenhof 2002). Direct mortality is increased by poisoning from lead and other contaminants, power line electrocutions, collision with wind turbines, and shooting (Phillips 1986, Harlow and Bloom 1989, Craig et al. 1990, Wingfield 1991, Leptich 1994, Avian Power Line Interaction Committee 1996, Hunt et al. 1997, Hoover 2002). Breeding success is limited by reduced habitat availability and decreased prey populations resulting from habitat conversion (Murphy 1977).

## MANAGEMENT RECOMMENDATIONS

Factors affecting golden eagle habitat and populations have not been extensively studied in Washington, but studies have been conducted throughout western North America, and the following reflect the findings of these studies. These recommendations generally apply to conditions east of the Cascade Range because very few North American studies have been conducted in high rainfall zones.

In general, golden eagle habitat should be managed to improve native vegetation and maintain native prey populations (e.g., jackrabbits, ground squirrels) (Andersen 1991). Management of grassland habitats can influence prey density, diversity and availability (Andersen 1991). In general, certain prey species decrease with reduced herbaceous cover and foliage height diversity (Kochert 1989). Prey such as jackrabbits and ground squirrels, are believed to be moderately tolerant to grazing but they disappear where habitat is overgrazed (i.e., repeated grazing that exceeds the recovery capacity of the vegetation and creates or perpetuates a deteriorated plant community). Severely damaged native grassland can be restored by removing livestock, using controlled burning or chaining to

remove trees and invasive shrubs, and reseed with native grasses (Kochert 1989). However, fire management should be conducted only after developing a professional fire management plan (see Washington State University Cooperative Extension Service in Appendix A), especially in low rainfall zones, where exotic vegetation (e.g., Cheatgrass [*bromus tectorum*]) often becomes dominant (Knick and Rotenberry 1995).

Burning and other techniques that reduce shrub stand density should be avoided in healthy shrub-steppe communities, such as those dominated by sagebrush, in order to maintain existing prey populations (Kochert et al. 1999, Kochert et al. 2002).

Few studies have documented the effects of habitat fragmentation on raptors. However, in several states, raptors survived only on large habitat patches (Robinson 1991). In arid regions, golden eagles require large expanses of undisturbed shrub habitat (Marzluff et al. 1997). Therefore, it is recommended that shrub stands be preserved within 3 km (1.9 mi) of golden eagle nests (Kochert et al. 1999). This distance accounted for 95% of eagle movements measured during the breeding season in western Idaho (Marzluff et al. 1997). Large-scale conversion of eagle foraging habitat should be avoided because it reduces prey abundance and availability. This is particularly important where prey are concentrated, such as at ground squirrel colonies. Many types of development that remove vegetation from localized areas, including oil, gas, and geothermal exploitation; power line, pipeline and road construction; and the development of campgrounds and other facilities may result in loss of habitat for certain prey species (Suter and Jones 1981).

Although empirical evidence is limited, recreation and other human activities near nests appear to cause breeding failure (Kochert et al. 2002). Rock climbing as well as development activities on or near cliffs containing nests should be avoided (De Smet 1987). Avoiding these activities is especially important during the nesting period of 15 February to 15 July (Beebe 1974; R. Friesz, personal communication). The establishment of buffer zones surrounding nests, wide enough to include 90-95% of flushing distances, is generally an accepted technique to reduce disturbance to nesting raptors (Olendorff and Stoddart 1974, Suter and Jones 1981, Mersmann and Fraser 1990). Buffer widths may be adjusted on a case by case basis (with the assistance of a professional wildlife biologist), depending on factors that may influence a pair's response to a particular disturbance, such as influence of terrain on the "line of sight" distance, security of the nest, history of disturbance, and elevation of the disturbance relative to the nest (Suter and Jones 1981; K. Steenhof, personal communication).

Holmes et al. (1993) found that wintering golden eagles are more likely to flush when approached by a human on foot than by a vehicle. They suggested that a buffer zone of 300 m (980 ft) would prevent flushing by 90% of eagles.

Golden eagles often have wing spans that are greater than the distances between conductive materials on power poles, which increases their probability of electrocution (Harness and Wilson 2001). Power lines and poles in any nesting or feeding area should be constructed so birds cannot make simultaneous contact between any two items of conductive equipment. Once an electrocution problem is identified on any existing structures, utility managers should ensure these are quickly retrofitted or modified to eliminate bird loss (Avian Power Line Interaction Committee 1996, Harness and Wilson 2001). Because multiple-phase transformers are believed to be associated with a disproportionate number of eagle electrocutions (Harness and Wilson 2001), the construction of this form of transformer should be avoided.

Rabbits and ground squirrels are important prey for golden eagles and have been targeted in control efforts. Rodent control should not occur within eagle foraging areas because it reduces the prey base (Eaton 1976, Phillips 1986, Young 1989). Shooting and rodenticides should be replaced by wildlife repellents for use in agricultural damage control. Two very effective jackrabbit/hare repellents available are trinitrobenzene-aniline (TNB-A), and zinc tetramethyl thiuram disulfide (TMTD) (Besser and Welch 1959). Another effective jackrabbit/hare repellent for use in orchards consists of a rosin and ethyl alcohol mixture (Cardinell 1958).

Because ground squirrels are an important prey of golden eagles (Kochert et al. 2002), spray application of pesticides near squirrel colonies should be avoided. If pesticides are to be sprayed, an additional buffer area should be used to prevent drift into the protected area. Droplet size, volume of compound and meteorological conditions should be factored into the buffer width (Kingsbury 1975, Brown 1978, Payne et al. 1988). Payne et al. (1988) describes a method for estimating buffer zone widths for pesticide application. In addition, pesticide use should be avoided during the ground squirrel breeding season, from early March to late May, and during the critical foraging time before estivation (dormancy period), mid-August through September (Carlson et al. 1980).

Organochlorine, organophosphate, and carbamate insecticides can be highly toxic to raptors and mammals, and their use in areas inhabited by golden eagles should be avoided (McEwen et al. 1972; Balcom 1983; Grue et al. 1983, 1986; Smith 1987; Hooper et al. 1989). If insecticides must be used, synthetic pyrethroid compounds may be an alternative. For example, permethrin is low in toxicity to raptors and mammals and bio-degrades rapidly (Grue et al. 1983, Smith and Stratton 1986). Repellents can be used with pesticides to deter golden eagle prey species from treated areas (Blus et al. 1989). If insecticide or herbicide use is planned for areas where this species occurs, review Appendix A for contacts to assist in assessing the use of chemicals and their alternatives.

From collection and clinical analysis of dead or dying golden eagles, toxic lead poisoning has been recently identified as a potential source of adult golden eagle mortality in eastern Washington (J. Watson, personal observation). Craig et al. (1990) and Craig and Craig (1995) found elevated levels of lead in golden eagles in southern Idaho and believed this may be a more serious problem than previously thought. The source of contamination is under investigation. If bullet fragments and lead shot prove to be the source of contamination, hunter removal of carcasses and gut piles from the field, or conversion to the now widely available and ballistically comparable non-toxic ammunition (e.g., tungsten-alloy shot, solid copper bullets) might substantially reduce lead exposure (G. Hunt, personal communication).

## REFERENCES

- Avian Power Line Interaction Committee. 1996. Suggested practices for raptor protection on power lines: the state of the art in 1996. Edison Electric Institute/Raptor Research Foundation, Washington D.C.
- Andersen, D. E. 1991. Management of North American grasslands for raptors. Pages 203-210 in B. Giron Pendleton and D. L. Krahe, editors. Midwest Raptor Management Symposium and Workshop. National Wildlife Federation, Washington D.C.
- Anderson, R. J., and A. M. Bruce. 1980. A comparison of selected bald and golden eagle nests in western Washington. Pages 117-120 in R. L. Knight, editor. Proceedings of the Washington Bald Eagle Symposium, Washington Department of Game, Seattle, Washington, USA.
- Balcom, R. 1983. Secondary poisoning of red-shouldered hawks with carbofuran. *Journal of Wildlife Management* 47:1129-1132.
- Bates, J. W., and M. O. Moretti. 1994. Golden eagle (*Aquila chrysaetos*) population ecology in eastern Utah. *Great Basin Naturalist* 54:248-255.
- Beebe, F. L. 1974. Field studies of Falconiformes (Vultures, Eagles, Hawks, and Falcons) of British Columbia. British Columbia Provincial Museum, Victoria, British Columbia, Canada.
- Beecham, J. J., and M. N. Kochert. 1975. Breeding biology of the golden eagle in southwestern Idaho. *Wilson Bulletin* 87:506-513.
- Besser, J. F., and J. F. Welch. 1959. Chemical repellents for the control of mammal damage to plants. *Transactions of the North American Wildlife Conference* 24:166-173.
- Blus, L. J., C. S. Staley, C. J. Henny, G. W. Pendleton, E. H. Craig, and D. K. Halford. 1989. Effects of organophosphorous insecticides on sage grouse in southeastern Idaho. *Journal of Wildlife Management* 53:1139-1146.
- Brown, A. W. A. 1978. Ecology of pesticides. John Wiley & Sons, New York, New York, USA.
- Bruce, A. M., R. J. Anderson, and G. T. Allen. 1982. Observation of golden eagles nesting in western Washington. *Raptor Research* 16:132-134.
- Cardinell, H. A. 1958. An effective repellent for European hares in Brazil. *Journal of Wildlife Management* 22:435-436.

- Carlson, L., G. Geupel, J. Kjelson, J. MacIvor, M. Morton, and N. Shishido. 1980. Geographic range, habitat requirements and a preliminary population study of *Spermophilus washingtoni*. Final Technical Report, National Science Foundation Student Originated Studies Program.
- Craig, E. H., and T. H. Craig. 1995. Lead levels in golden eagles in southeastern Idaho. *Journal of Raptor Research* 29:54-55.
- Craig, T. H., J. W. Connelly, E. H. Craig, T. L. Parker. 1990. Lead concentrations in golden and bald eagles. *Wilson Bulletin* 102:130-133.
- De Smet, K. D. 1987. Status report on the golden eagle (*Aquila chrysaetos*). Committee on the Status of Endangered Wildlife in Canada, Ottawa, Ontario, Canada.
- Eaton, R. L. 1976. Golden eagle. Pages 82-118 in J. D. Brittell, J. David, J. M. Brown, R. L. Eaton, and C. A. Starika, editors. *Marine Shoreline Fauna of Washington Vol. II*. Washington Department of Game and Washington Department of Ecology, Olympia, Washington, USA.
- Franson, J. C., L. Sileo, and N. J. Thomas. 1995. Causes of eagle deaths. Page 68 in E. T. LaRoe, G. S. Farris, C. E. Puckett, P. D. Doran, and M. J. Mac, editors. *Our living resources: a report to the nation on the distribution, abundance, and health of U.S. plants, animals, and ecosystems*. U.S. Department of the Interior, National Biological Service, Washington, D.C., USA.
- Grue, C. E., L. R. DeWeese, P. Mineau, G. A. Swanson, J. R. Foster, P. M. Arnold, J. N. Huckins, P. J. Sheehan, W. K. Marshall, and A. P. Ludden. 1986. Potential impacts of agricultural chemicals on waterfowl and other wildlife inhabiting prairie wetlands: an evaluation of research needs and approaches. *Transactions of the North American Wildlife and Natural Resource Conference* 51:357-383.
- \_\_\_\_\_, W. J. Fleming, D. G. Busby, and E. F. Hill. 1983. Assessing hazards of organophosphate pesticides to wildlife. *Transactions of the North American Wildlife and Natural Resource Conference* 48:200-220.
- Harlow, D. L., and P. H. Bloom. 1989. Buteos and the golden eagle. Pages 102-110 in *Proceedings of the Western Raptor Management Symposium and Workshop*. National Wildlife Federation, Washington, D.C.
- Harness, R. E., and K. R. Wilson. 2001. Electric-utility structures associated with raptor electrocutions in rural areas. *Wildlife Society Bulletin* 29: 612-623.
- Holmes, T. L., R. L. Knight, L. Stegall, and G. R. Craig. 1993. Responses of wintering grassland raptors to human disturbance. *Wildlife Society Bulletin* 21:461-468.
- Hooper, M. J., P. J. Detrich, C. P. Weisskopf, and B. W. Wilson. 1989. Organophosphorous insecticide exposure in hawks inhabiting orchards during winter dormant spraying. *Bulletin of Environmental Contaminant Toxicology* 42:651-659.
- Hoover, S. 2002. Response of red-tailed hawks and golden eagles to topographical features, weather, and abundance of a dominant prey species at the Altamont Pass Wind Resource Area, California: April 1999-December 2000. National Renewable Energy Laboratory, Golden, Colorado, USA.
- Hunt, W.G., R.E. Jackman, T.L. Brown, D.E. Driscoll and L. Culp. 1997. A population study of golden eagles in the Altamont Pass Wind Resource Area; second-year progress report. Predatory Bird Research Center, Long Marine Laboratory, University of California, Santa Cruz, California, USA.
- Kingsbury, P. D. 1975. Effects of aerial forest spraying on aquatic fauna. in M. L. Prebble, editor. *Aerial control of forest insects in Canada*. Ministry of the Environment, Ottawa, Ontario, Canada.
- Knick, S. T., and J. T. Rotenberry. 1995. Landscape characteristics of fragmented shrub-steppe habitats and breeding passerine birds. *Conservation Biology* 9:1059-1071.
- Knight, R. L., J. B. Athearn, J. J. Brueggeman, and A. W. Erickson. 1979. Observations on wintering bald and golden eagles on the Columbia River, Washington. *The Murrelet* 60:99-105.
- Kochert, M. N. 1989. Responses of raptors to livestock grazing in the western United States. Pages 194-203 in *Proceedings of the Western Raptor Management Symposium*. National Wildlife Federation, Washington, D.C.
- \_\_\_\_\_, and K. Steenhof. 2002. Golden eagles in the U.S. and Canada: status, trends, and conservation challenges. *Journal of Raptor Research* 36:32-40.
- \_\_\_\_\_, \_\_\_\_\_, L. B. Carpenter, and J. M. Marzluff. 1999. Effects of fire on golden eagle territory occupancy and reproductive success. *Journal of Wildlife Management* 63:773-780.
- \_\_\_\_\_, \_\_\_\_\_, C. L. McIntyre, and E. H. Craig. 2002. Golden eagle (*Aquila chrysaetos*). No. 684 in A. Poole and F. Gill, editors. *The birds of North America*. Academy of National Science and American Ornithologists' Union, Philadelphia, Pennsylvania, USA.
- Larrison, E. J., and K. G. Sonnenberg. 1968. *Washington birds: their location and identification*. Seattle Audubon Society, Seattle, Washington, USA.
- Leptich, D. J. 1994. Agricultural development and its influence on raptors in southern Idaho. *Northwest Science* 68:167-171.



- Marr, N. V., and R. L. Knight. 1983. Food habits of golden eagles in eastern Washington. *Murrelet* 64:73-77.
- Marzluff, J. M., S. T. Knick, M. S. Vekasy, L. S. Schueck, and T. J. Zarriello. 1997. Spatial use and habitat selection of golden eagles in southwestern Idaho. *Auk* 114:673-687.
- McEwen, L. C., C. E. Knittle, and M. L. Richmond. 1972. Wildlife effects from grasshopper insecticides sprayed on short-grass range. *Journal of Range Management* 25:188-194.
- McGahan, J. 1967. Quantified estimates of predation by a golden eagle population. *Journal of Wildlife Management* 31:496-501.
- McIntyre, C. L. 2002. Patterns in nesting area occupancy and reproductive success of golden eagles (*Aquila chrysaetos*) in Denali National Park and Preserve, Alaska, 1988-99. *Journal of Raptor Research* 36:50-54.
- Menkens, G. E., Jr., and S. H. Anderson. 1987. Nest site characteristics of a predominantly tree-nesting population of golden eagles. *Journal of Field Ornithology* 58:22-25.
- Mersmann, T. J., and J. D. Fraser. 1990. Management of raptor foraging habitat in the southeast. Proceedings of the southeast raptor management symposium and workshop. National Wildlife Federation Science and Technical Series Number 14. Baltimore, Maryland, USA.
- Murphy, J. R. 1977. Status of eagle populations in the western United States. In R. D. Chancellor, editor, Proceedings of the World Conference on Birds of Prey, Vienna, Austria.
- Olendorff, R. R. 1976. The food habits of North American golden eagles. *American Midland Naturalist* 95:231-236.
- \_\_\_\_\_, and J. W. Stoddard, Jr. 1974. The potential for management of raptor populations in western grasslands. Pages 47-88 in F. N. Hamerston, Jr., B. E. Harrell, and R. R. Olendorff, editors. Management of raptors. Raptor Research Foundations Raptor Research Report Number 2, Vermillion, SD, USA.
- Payne, N. J., B. V. Helson, K. M. S. Sundaram, and R. A. Flemming. 1988. Estimating buffer zone widths for pesticide applications. *Pesticide Science* 24:147-161.
- Phillips, R. 1986. Current issues concerning management of golden eagles in western U.S.A. Denver Wildlife Research Center, U.S. Fish and Wildlife Service Birds of Prey Bulletin Number 3, Sheridan, Wyoming, USA.
- \_\_\_\_\_, T. P. McEneaney, and A. E. Beske. 1984. Population densities of breeding golden eagles in Wyoming. *Wildlife Society Bulletin* 12:269-273.
- Richardson, S.A., A.E. Potter, K.L. Lehmkuhl, R. Mazaika, M.E. McFadzen, and R. Estes. 2001. Prey of ferruginous hawks breeding in Washington. *Northwestern Naturalist*. 82:58-64.
- Robinson, S. K. 1991. Effects of habitat fragmentation on Midwestern raptors. Pages 195-202 in B. Giron Pendleton and D. L. Krahe, editors. Midwest Raptor Management Symposium and Workshop. National Wildlife Federation, Washington D.C.
- Smith, G. J. 1987. Pesticide use and toxicology in relation to wildlife: organophosphorus and carbamate compounds. U.S. Fish and Wildlife Service Research. Publication Number 170, Washington, D.C.
- Smith, T. M., and G. W. Stratton. 1986. Effects of synthetic pyrethroid insecticides on nontarget organisms. *Residue Reviews* 97:93-120.
- Snow, C. 1973. Golden eagle. Habitat Management Series for unique or endangered species. Bureau of Land Management Technical Report Number 7. Denver, Colorado, USA.
- Steenhof, K., and M. N. Kochert. 1988. Dietary responses of three raptor species to changing prey densities in a natural environment. *Journal of Animal Ecology* 57:37-48.
- \_\_\_\_\_, \_\_\_\_\_, and T. L. McDonald. 1997. Interactive effects of prey and weather on golden eagle reproduction. *Journal of Animal Ecology* 66:350-362.
- Suter, G. W., and J. L. Joness. 1981. Criteria for golden eagle, ferruginous hawk, and prairie falcon nest site protection. *Journal of Raptor Research* 15:12-18.
- Wingfield, G. A. 1991. Central plains buteos and golden eagle. Pages 60-68 in B. G. Pendleton and D. L. Krahe, editors. Midwest Raptor Management Symposium and Workshop. National Wildlife Federation, Washington D. C.
- Yensen, E., and P. W. Sherman. 2003. Ground-dwelling squirrels of the Pacific Northwest. U.S. Fish and Wildlife Service, Boise, Idaho, USA.
- Young, L. S. 1989. Effects of agriculture on raptors in the western U.S. Pages 209-218 in Proceedings of the Western Raptor Management Symposium and Workshop. National Wildlife Federation, Washington, D.C.

## PERSONAL COMMUNICATIONS

Ron Friesz, Wildlife Biologist  
Washington Department of Fish and Wildlife  
Ephrata, Washington

Karen Steenhof, Wildlife Research Biologist  
U.S. Geological Survey, Biological Resource Division  
Forest and Rangeland Ecosystem Science Center  
Snake River Field Station  
Boise, Idaho

Grainger Hunt, Senior Scientist  
Peregrine Fund  
McArthur, California

Steve Zender, District Wildlife Biologist  
Washington Department of Fish and Wildlife  
Chewelah, Washington

## KEY POINTS

### Habitat Requirements

- Commonly associated with open, arid plateaus deeply cut by streams and canyons, western shrub-steppe and grassland communities and transition zones between shrub, grassland and forested habitat. Nests usually located on cliffs and trees.
- Use the same territory annually, but have an average of 2-3 alternative nests used in different years.
- Although yellow-bellied marmots are the most important prey of nesting golden eagles, jackrabbits and ground squirrels were probably the most significant historical prey for eagles in the Northwest.
- Carrion is important prey during the fall and winter.
- Home range size, size of core areas, and travel distances can vary dramatically based on habitat composition, potential prey abundance, and individual preferences.

### Management Recommendations

- Manage golden eagle habitat to improve native vegetation and maintain native prey populations
- Restore severely damaged grassland (e.g., non-shrub) habitat with controlled burning or chaining of trees and invasive shrubs, followed by reseeding with native grasses.
- Preserve shrub-dominated habitat (i.e., sagebrush) within 3 km (1.9 mi) of golden eagle nests and avoid practices that remove shrub cover (i.e., chaining or burning).
- Avoid new development and human activities near nest sites (especially between 15 February and 15 July).
- Designate spatial buffer areas to protect nests and juvenile eagles.
- Construct or modify power lines and poles so birds cannot make simultaneous contact between any two items of conductive equipment and avoid construction of multiple-phase transformers.
- Avoid rodent control within eagle foraging areas.
- Avoid using organochlorine, organophosphate, and carbamate insecticides in eagle habitat and prey concentration areas.